

REMARKS

Claims 17 – 25 and 35 – 37, drawn to a non-elected invention, are canceled.

Claims 5 – 11, 13, and 32 – 34 are currently withdrawn as being directed to a non-elected species. Applicants request reinstatement of these claims upon allowance of a generic or linking claim.

Claims 1 – 4, 12, 14, 15, and 26 – 31 are amended. Support for the amendments to the claims can be found, for example, in the claims as originally filed and at pages 2 – 6 of the specification.

Claims 38 – 41 are added. Support for new claims 38 – 41 can be found, for example, in the claims as originally filed and at pages 2 – 6 of the specification.

The rejection of claims 1 – 4, 12, 14, and 26 – 31 under 35 USC § 112, first paragraph is rendered moot by the amendments to the claims. The claims as amended are limited to tungsten and tungsten compound films.

Claims 14, 15, 28, and 31 have been amended to clarify the nature of the claimed invention, per the Examiner's requests and suggestions.

The rejection of claims 1, 12, 27, and 30 under 35 USC § 102(b) over Wolf, Silicon Processing for the VLSI Era, Vol. 2 – Process Integration, is respectfully traversed. Wolf describes a method for selectively depositing tungsten via reduction of silicon from the substrate surface, hydrogen gas, and/or silane gas. However, Wolf does not describe or suggest a method of supplying a substance to

the surface in a preparation step that restricts adhesion of a material for forming a tungsten or tungsten compound film. Additionally, the Office Action asserts that supplying Ar or WF_6 somehow serves to restrict formation of nuclei on the substrate surface. Applicants are unable to find a discussion in Wolf of how Ar or WF_6 cause a restriction of nuclei formation, as required by the claimed invention. Because Wolf fails to describe or suggest all elements of the claimed invention, reconsideration and withdrawal of the rejection are respectfully requested.

The rejection of claims 1 – 4, 12, 26, 27, 29, and 30 under 35 USC § 102(e) over Park et al., US Patent 6,087,257 is also respectfully traversed. Park et al. discloses a method of forming tungsten nitride layers with WF_6 as a source of tungsten and NH_3 as a source of nitrogen. However, Park et al. fails to describe or suggest of first supplying a substance that restricts adhesion and nucleation, and subsequently supplying a material for forming a tungsten compound film (tungsten nitride). Park et al. describes forming a tungsten nitride film by introducing a tungsten containing substance (such as WF_6), a nitrogen containing substance (such as NH_3), and a reducing agent. Based on the disclosure, it appears that all three substances should be introduced at the same time. No mention is ever made of introducing one of the substances before the other two.

Applicants note that Park et al. does describe first forming an ohmic layer, which can be a tungsten containing compound, and then in-situ forming a

tungsten nitride film on the ohmic layer. (See Col. 4, lines 1 – 61) However, Park et al. provides no disclosure or suggestion that the state of the processing chamber between formation of the ohmic layer and the tungsten nitride layer is important. In particular, Park et al. does not disclose or suggest that any substance that could restrict adhesion or nucleation (such as WF_6) should be preserved on the surface after formation of the ohmic layer. The fact that the tungsten nitride layer can be formed “in situ” after formation of the ohmic layer does not in and of itself imply or suggest that reactants from formation of the ohmic layer should be retained during a subsequent tungsten nitride formation step. Reconsideration and withdrawal of the rejection are respectfully requested.

The rejection of claims 1, 12, 14, 15, 26, 27, 29, and 30 under 35 USC § 102(b) over Choi, US Patent 5,633,201 is also respectfully traversed. Choi discloses a method for forming tungsten plugs in contact holes on a semiconductor substrate. Choi describes treating a first tungsten plug with a halogen containing plasma to prevent further growth of the tungsten plug. A second tungsten plug is then formed at a separate location on the surface. However, Choi fails to describe or suggest supplying and adsorbing a substance to restrict adhesion and nucleation of a material for forming a tungsten or tungsten compound film, as required by the claimed invention. Choi does not indicate that any substance is left behind on the first tungsten plug after the plasma treatment. However, even if a substance is left behind, one of skill in the art would expect it to be a chemisorbed halogen species, formed when a halogen

radical bonded with the surface of the tungsten. Choi provides no disclosure or suggestion of adsorbing a substance on a surface to restrict adhesion or nucleation of a material for forming the tungsten plug. Reconsideration and withdrawal of the rejection are respectfully requested.

The rejection of claims 1, 12, 15, 15, 29, and 31 under 35 USC § 102(b) over Lee et al., US Patent 5,563,090 is also respectfully traversed. Lee et al. discloses a method for forming a DRAM cell capacitor that includes formation of TiN and tungsten layers. Lee et al. describes forming a tungsten layer on a TiN layer. Lee et al. notes that WF_6 tends to form fewer nuclei on a TiN layer. However, the TiN layer described in Lee et al. is clearly a chemisorbed layer. By contrast, the claimed invention requires supplying and adsorbing onto a surface a substance that restricts adhesion and formation of nuclei by a material for forming a tungsten or tungsten nitride film. Thus, Lee et al. fails to disclose or suggest all of the elements of the claimed invention. Reconsideration and withdrawal of the rejection are respectfully requested.

The rejection of claims 1, 12, 14, 15, 26, 27, 29, and 30 under 35 USC § 102(b) over Hirase, EP 0349695 is also respectfully traversed. Hirase discloses a method for depositing metals on a silicon substrate. Hirase describes using a halogen containing gas to remove native oxides prior to depositing the metal. However, Hirase provides no disclosure or suggestion that the halogen containing gas should be adsorbed onto the surface or that such an adsorbed gas would restrict adhesion or formation of nuclei for a material used to form a metal

film. Thus, Hirase fails to disclose or suggest all of the elements of the claimed invention. Reconsideration and withdrawal of the rejection are respectfully requested.

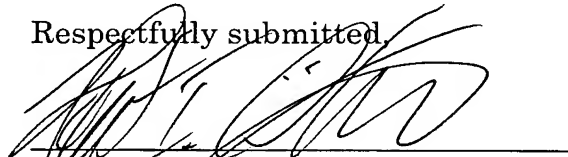
In view of the foregoing, the application is respectfully submitted to be in condition for allowance, and prompt favorable action thereon is earnestly solicited.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #010986.51302).

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